

# EPIC TRIENNIAL INVESTMENT PLAN 2015-17

## Proposed Energy Research Initiative

### Questionnaire

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**Title of Proposed Initiative: Integrated Renewable Energy Innovation Cluster**

**Investment Areas** (Check one or more) – *For definitions, see First Triennial Investment Plan, page 10*

☒ *Applied Research and Development*      ☒ *Technology Demonstration and Deployment*

☐ *Market Facilitation*

**Electricity System Value Chain (Check only one):**

☐ *Grid operations/market design*

☒ *Generation*

☐ *Transmission*

☐ *Distribution*

☐ *Demand-side management*

**Issues and Barriers:**

**Describe the issues and barriers that are impeding full market adoption of the proposed clean energy technology or strategy (such as cost, integration, or lack of information).**

Renewable energy generation has its own unique issues and barriers to more fully penetrating the market. The capital intensity of many of the renewable segments, such as biofuels and solar manufacturing, coupled with many high profile bankruptcies (e.g., Solyndra) gives pause to most venture capital investors. Renewables may look less attractive to many investors that may compare renewable deals to software plays that require far less seed and early stage investment to reach scale and may also have the prospect of higher profit margins. There are fewer entrepreneurs trying to push capital intensive deals into the market. For these and other deals, renewable energy entrepreneurs are generally partnering earlier in their commercialization process with strategic customers and organizations like cities and special governmental districts, many of which have policies and constituencies and legislative mandates that promote renewable energy.

Deploying renewable technologies is also inhibited by customers having difficulty obtaining financing for projects, competition with revenue generating investments, and technical issues such as integration with energy management software systems and even difficulties in securing interconnection agreements with utilities.

**Initiative Description and Purpose:**

**How will this technology or strategy help address the issue/issues? Describe knowledge to be advanced to overcome critical barriers. Include the recommended funding level (minimum and maximum) for each project under this initiative.** The proposed “Integrated Renewables Innovation Cluster” will draw together core universities and research entities, cities and special districts including ports and water agencies, the engineering and industrial communities, and will be led by the Enterprise Futures Network (EFN) ([www.enterprise-futures.org](http://www.enterprise-futures.org)), an eleven year old 501 C 3 educational non-profit. The EFN led cluster will focus on the public sector which values the use of cleaner energy, and the development and testing of emerging and commercializable renewable energy technologies. The proposed funding level is \$1 million per year through the duration of the EPIC program. This program will build upon the work of Enterprise Futures’ well-established university based energy and clean technology commercialization programs with ten universities across the U.S including several institutions in California.

The proposed program will draw together, beginning in 2014 and on an ongoing basis, universities, cities and special districts, and other core participants on both sides of the San Francisco Bay for ongoing review and support of emerging, commercializable and market-ready renewable energy technologies.

Within this effort, EFN, based in Sausalito, California, will serve as a catalyst for the renewable energy research and technology development region wide. As these technologies are identified, they will be presented at regular technology specific forums and larger conferences at universities that we work with in the region. At each conference, training will also be provided, in association with regional universities, on commercialization and use of the promising renewable technologies. The program will leverage a web based innovation cluster platform to connect inventors and developers of technologies with investors and municipal partners. The program will involve

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collaboration with major municipalities, ports, water agencies, industry, and the university sector in this region. Within our service area, there are more than 60 municipal entities, and a large number of colleges and universities.

#### **Stakeholders:**

##### **Identify the stakeholders who support the initiative.**

Enterprise Futures Network  
Burns & McDonnell

Through Burns & McDonnell, we anticipate receiving support and technology piloting opportunities as part of an Energy Innovation Initiative that Burns & McDonnell is the lead engineering firm for the Port of Oakland (Port of Oakland and Oakland International Airport).

##### **Potential Additional Supporters**

Local government associations, such as the Association of Bay Area Governments (ABAG), StopWaste.org, and others will be contacted to discuss their participation and support. We will contact universities in the EFN network including Stanford University, UC Berkeley, and UC Davis and other universities and universities within Caltech's FLoW program (the lead for DOE's Western Regional Business Plan Competition) where EFN is Caltech's Mentorship Program Partner. Others that we will contact include the DOE Industrial Assessment Center at San Francisco State University (that expressed interest in supporting the initiative), Carnegie Mellon University - Silicon Valley, UC San Francisco, Joint Venture Silicon Valley, Cal Poly San Luis Obispo, and major venture capital firms, including Accel Partners. Our management has many years of experience working with many locally based commercial and industrial firms, PG&E, the Port of Oakland, SFO, NASA Ames, and many cities in the Bay Area, including San Francisco, Oakland, and San Jose.

#### **Background and the State-of-the-Art:**

**What research development and demonstration has been done or is currently being done to advance this technology or strategy (cite past research as applicable)?** There is extensive activity in these categories underway within the university community, utilities, and commercial/industrial firms, and cities but they are not unified or effectively integrated within utilities and public sector community to be applied on renewable energy generation.

**Describe any public and/or private successes and failures the technology or strategy has encountered in its path through the energy innovation pipeline: lab-scale testing, pilot-scale testing, pre-commercial demonstration, commercial scale deployment, market research, workforce development.** Our principals recently played an important role in executing a large microgrid demonstration project in the San Diego area that is an integrated microgrid deployment that leverages solar and battery storage and a price based demand response program. This project showed a very positive benefit-cost ratio, identified 28 cost-effective other potential deployment sites and the findings of this project could be used to identify more than 50 sites in this initiative.

**Identify other related programs and initiatives that deal with the proposed technology or strategy, such as state and federal programs or funding initiatives (DOE, ARPA-E, etc.).** Other programs and initiatives that deal with renewables and commercialization of renewable technology include the DOE National Clean Energy Incubators, the DOE National Business Plan Competition (EFN is the mentorship partner to the South Western Regional DOE Competition managed by Rice University and the Western Regional DOE Competition managed by the Caltech.) Other programs are the DOE SunShot Initiative, DOE Innovation Ecosystems (one is out of UC San Diego), the national DOE Wave Energy Test Site program, the ARPA-E programs in renewables integration and storage.

#### **Justification:**

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**Describe how this technology or strategy will provide California IOU electric ratepayer benefits and provide any estimates of quantified annual savings/benefits in California, including:**

- **Name of sector and estimated size and energy use.** There are more than 60 cities and several water districts, ports and airports in Alameda, Santa Clara, San Mateo, San Francisco counties.
- **Quantifiable performance improvements for the proposed technology/strategy.** The cities and public agencies are organized within highly unified organizations such as ABAG. If best renewable energy technologies are developed and showcased within this program, there can be rapid integration of them throughout the municipal community.
- **Maximum market potential, if successful.** California is on the leading edge of renewable energy use in the U.S. and is also known worldwide. Technologies developed and deployed in California including advanced solar, wind, biomass/fuels and wave technologies, can be deployed nationally through the integrated national investment and engineering community and industry forums.
- **Number of direct jobs created in California.** There would be at least 1000 jobs created in California through this program.
- **Why this research is appropriate for public funding.** Breaking down barriers to commercialization and use of renewable power in the public sector will help California meet current and future renewable portfolio standard and greenhouse gas goals, create more clean energy jobs in California and help California maintain its worldwide leadership position in clean energy.

**Ratepayer Benefits** (Check one or more):

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> X promote greater reliability | <input type="checkbox"/> X Potential energy and cost savings   |
| <input type="checkbox"/> Increased safety                         | <input type="checkbox"/> X Societal benefits                   |
| <input type="checkbox"/> X Environmental benefits – specify       | <input type="checkbox"/> X GHG emissions mitigation/adaptation |
| <input type="checkbox"/> Low emission vehicles/transportation     | <input checked="" type="checkbox"/> X Waste reduction          |
| <input type="checkbox"/> X Economic development                   |  |

**Describe specific benefits (qualitative and quantitative) of the proposed initiative**

The Integrated Renewables Innovation Cluster program will bring together, on a continuing basis, the top research and commercializable renewable-related technologies, and integrate it into the San Francisco Bay Area's public agencies and engineering firms, in support of national technology acceptance and utilization, through a highly orchestrated series of programs, research projects, and training initiatives and conferences.

**Public Utilities Code Sections 740.1 and 8360:**

**Please describe how this technology or strategy addresses the principles articulated in California Public Utilities Code Sections 740.1 and 8360.** Under Section 740.1., the project would offer a reasonable probability of providing benefits to ratepayers, not unnecessarily duplicate research, support environmental improvement, conservation by efficient resource use or by reducing or shifting system load, development of new resources and processes, particularly renewable resources and processes which further supply technologies, and improve operating efficiency and reliability or otherwise reduce operating costs. Under Section 8360, the project would help to modernize the state's electrical transmission and distribution system to maintain safe, reliable, efficient, and secure electrical service, including deployment and integration of cost-effective distributed resources and generation, including renewable resources, and development and incorporation of cost-effective demand response, demand-side resources, and energy-efficient resources.